South Coast Air Quality Management District

Facility Prioritization Procedures
For
AB 2588 Program

August 2004

TABLE OF CONTENTS

I. INTRODUCTION

The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (commonly known as AB 2588) established a statewide program for the inventory of air toxics emissions from individual facilities as well as requirements for risk assessment and public notification of potential health risks. AB 2588 requires the South Coast Air Quality Management District (AQMD) to designate high, intermediate and low priority categories and include each facility within the appropriate category based on its individual priority. In establishing priorities, the AQMD is to consider the potency, toxicity, quantity and volume of hazardous materials released from the facility; the proximity of the facility to potential receptors, including, but not limited to, hospitals, schools, daycare centers, worksites and residences; and any other factors that the AQMD finds and determines may indicate that the facility may pose a significant risk to receptors.

II. FACILITY PRIORITIZATION PROCEDURE

This document describes the facility prioritization procedure utilized by the AQMD. The procedure is based on the Emissions and Potency Procedure recommended by the Facility Prioritization Guidelines of the AB 2588 Risk Assessment Committee of the California Air Pollution Control Officers Association (CAPCOA, 1990). However, the CAPCOA procedure primarily relies on three parameters to prioritize facilities: emissions, potency or toxicity, and the proximity to potential receptors. The AQMD refined the CAPCOA procedure to include adjustment factors for receptor proximity, exposure period, and averaging times in addition to the treatment of multi-pathway pollutants. The AQMD Board adopted the refined prioritization procedure on September 1990. Basically, a facility receives two scores: one for carcinogenic effects and the other for non-carcinogenic effects. The facility is then ranked based on the highest of these two scores. Three categories are used in the ranking: high priority (Category A), intermediate priority (Category B) and low priority (Category C). Facilities designated as high priority are required to submit Heath Risk Assessments to assess the risk to their surrounding community. Facilities ranked with intermediate priority are considered to be District tracking facilities, which are then required to submit complete toxics inventory once every four years. Facilities ranked with low priority are exempt from reporting. The following thresholds are used to prioritize facilities:

Total Facility Score	**Category**
$TS > 10$	High Priority
$1 < TS \leq 10$	Intermediate Priority
$TS \leq 1$	Low Priority

A. Calculation of Carcinogenic Score

The facility score for carcinogenic effects is calculated as follows:

$$TS = \{ \sum (E_c) (URF_c) (MP_c) \} (RP) (EX) (1700.0)$$

Where;

TS = total facility score, the sum of score for all carcinogens
c = specific carcinogen
E_c = annual emissions of carcinogen c (lbs/year)
URF_c = unit risk factor of carcinogen substance c $(ug/m^3)^{-1}$
MP_c = multi-pathway adjustment factor of carcinogen c
RP = receptor proximity adjustment factor
EX = exposure adjustment factor
1700 = normalization factor

Annual Emissions:

Annual emissions of carcinogens are taken from the Facility Summary Forms TACS and TACS-O of the Annual Emission Reporting (AER) Program. Each toxic substance has a degree of accuracy associated with them which is nothing more than a de minimis emission level for reporting. As a result, facility-wide emissions of toxics greater than one-half of their corresponding degree of accuracy are inventoried and reported. Conversely, total facility toxic emissions less than one-half of their corresponding degree of accuracy levels are not considered in the computation. The substances and associated degree of accuracy levels are listed in Table 1.

Unit Risk Factor:

The unit risk factor (URF) is a measure of the cancer potency of a carcinogen. The unit risk factor is the estimated probability that a person will contract cancer as a result of inhalation of a concentration of 1 ug/m^3 of the TAC continuously over a period of 70 years.

The unit risk factors used in these procedures are published by the Office of Environmental Health Hazard Assessment (OEHHA). The latest URF values can be obtained from the following website:
http://www.arb.ca.gov/toxics/healthval/contable.pdf.

Multi-pathway Adjustment Factor:

The multi-pathway (MP_c) adjustment factor is used for carcinogenic substances that may contribute to risk from exposure pathways other than inhalation. These substances deposit on the ground in particulate form and contribute to risk through ingestion of soil or backyard garden vegetables or through other routes. This factor is used to account for additional risks from exposure through non-inhalation pathways. The MP_c adjustment factors for specific carcinogenic compounds have been developed by AQMD staff and are taken from the AQMD Risk Assessment Procedures for Rules 1401 and 212 (Table 8). For all other carcinogens, the MP_c adjustment factor is set to one (1.0). The AQMD Risk Assessment Procedures for Rules 1401 and 212 can be obtained from the following web site: www.aqmd.gov/permit/RiskAssessment.html

Receptor Proximity Adjustment Factor:

The Receptor Proximity (RP) adjustment factor is calculated based on the distances from the facility to the nearest residence and the nearest worksite or commercial site. Receptor locations are off-site locations where persons may be exposed to toxic emissions from equipment. Residential receptor locations include current residential land uses and areas that may be developed for residential uses in the future, given land use trends in the general area. The residential receptor distance is defined as the closest distance between any source of air toxic emissions at the facility and the property boundary of any one of the residential receptor locations. Commercial receptor locations include areas zoned for manufacturing, light or heavy industry, retail activity, or locations that are regular work sites. For facilities with a single source, the receptor distance is from the stack or the center of the source (e.g., center of the building containing a source or sources) to the nearest receptor location. For facilities with many sources, the receptor distance is from the approximate center of the area containing the sources to the nearest receptor location. The receptor distances are taken from the facility's Form X. A distance of 50 meters is assumed for a facility without specified receptor distances corresponding to the highest adjustment factor.

The RP adjustment factor is calculated from the following table:

Receptor Proximity (R in m)	Adjustment Factor (RP)
$0 < R < 50$	1.000
$50 < R < 100$	$-0.015 R + 1.75$
$100 < R < 250$	$-0.0014 R + 0.39$
$250 < R < 500$	0.040
$500 < R < 1000$	0.011
$1000 < R < 1500$	0.003
$1500 < R < 2000$	0.002
$2000 < R$	0.001

Exposure Adjustment Factor:

The Exposure (EX) adjustment factor is based on the receptor type and the operating hours of the facility. For a residential receptor, this factor is set to one (1.0), the highest factor. For a worksite, the adjustment factor is determined based on the annual operating hours of the prioritized facility as follows:

Annual Operating Hours of the Prioritized Facility	Worksite Adjustment Factor
Default (40/70, OEHHA assumes a 40 yr worker career)	0.54
≥ 4000	0.28
≥ 5600	0.20
≥ 8000	0.14
Continuous	0.13

In the case that facility operating hours are not provided, default values of 8 hrs/day, 5 days/wk and 50 wks/yr are used. The RP and the EX adjustment factors are calculated for both the closest residence and worksite.

B. Calculation of Non-Carcinogenic Score

For a toxic substance, non-cancer health effects can occur via acute and/or chronic exposure and both of these non-cancer effects are used in the facility prioritization. For each substance associated with both acute and chronic toxicity, the AQMD calculates separate scores using the formula shown below and then uses only the highest of the two scores (one for acute toxicity and one for chronic toxicity). The total facility score is then obtained by summing the highest scores for each substance emitted.

For a facility which emits pollutants with known non-cancer chronic health effects, its score for non-carcinogenic effects is calculated as follows:

$$TS^* = \sum \{ (E_t (MP_t) / REL_t \} (RP) (150.0)$$

Where;

TS^* = total facility score, the sum of score for all substances with non-carcinogenic effects
t = toxic substance
E_t = average hourly emissions of substance t (lbs/hr)
REL_t = reference exposure level of substance t (ug/m^3)
MP_t = multi-pathway adjustment factor of non-cancer chronic substance t
RP = receptor proximity adjustment factor
150 = normalization factor

For a facility which emits pollutants with known non-cancer acute health effects, its score for non-carcinogenic effects is calculated as follows:

$$TS^* = \sum \{ (E_t) / REL_t \} (RP) (AT_t) (1500.0)$$

Where;

TS^* = total facility score, the sum of score for all substances with non-carcinogenic effects
t = toxic substance
E_t = maximum hourly emissions of substance t (lbs/hr)
REL_t = reference exposure level of substance t (ug/m^3)
RP = receptor proximity adjustment factor
AT_t = averaging time adjustment factor
1500 = normalization factor

Average and Maximum Hourly Emissions:

Two different emissions rates are required for calculating the facility score for non-cancer health effects. The methodology for calculating the non-carcinogenic score for chronic exposure requires average hourly emissions (in lbs/hr) for each emitted pollutant whereas calculation of the non-carcinogenic score for acute exposure requires maximum hourly emissions (in lbs/hr) for each emitted pollutant. Average hourly emission is obtained by dividing the pollutant annual emissions (in lbs/yr) by 8760 hours. Maximum hourly emission is obtained by dividing the pollutant annual emissions (in lbs/yr) by the facility's actual operating hours which is then multiplied by maximum hourly emission adjustment factor of 1.25. Annual emissions are taken from the Facility Summary Forms TACS and TACS-O of the AER Program. As specified in Section II.A, emissions of specified substances, which are below one-half of their corresponding degree of accuracy levels are neglected in the computation.

Reference Exposure Levels:

Reference exposure levels (REL) is used as an indicator of potential adverse non-cancer health effects. An REL is a concentration level (ug/m^3) or dose (mg/kg-day) at which no adverse health effects are anticipated.

The RELs used in these procedures are published by OEHHA. The latest REL values can be obtained from the following website:
http://www.arb.ca.gov/toxics/healthval/contable.pdf.

Multi-pathway Adjustment Factor:

The multi-pathway (MP_t) adjustment factor is used for chronic substances that may contribute to risk from exposure pathways other than inhalation. Similar to discussion in Section II.A, MP_t adjustment factors only exist for selected chronic pollutants which can be obtained from the AQMD Risk Assessment Procedures for Rules 1401 and 212 (Table 8). For all other non-cancer chronic health effects compounds, the MP_t adjustment factor is set to one (1.0).

Receptor Proximity Adjustment Factor:

The Receptor Proximity (RP) adjustment factor is calculated based on the distances from the facility to the nearest residence and the nearest worksite. This is the same adjustment factor used in the calculation of the facility carcinogenic score discussed in Section II.A.

Averaging Time Adjustment Factor:

Most of acute compounds have RELs developed over maximum one-hour exposure. However, there are several acute compounds with RELs developed over 4-, 6-, or 7-hour exposure times. For these compounds, Averaging Time (AT) adjustment factors as defined in AQMD Rule 1401 have been developed, using air quality models for point and volume type sources, to reflect the risk based on the averaging times. The following adjustment factors are utilized in these procedures:

Acute Averaging Time (hrs)	Adjustment Factor
1	1.0
4	0.95
6 or 7	0.88

C. Facility Ranking

From the computed scores for carcinogenic and non-carcinogenic effects, the total facility score is taken as the highest of the two scores. Based on this highest score, the facility is ranked as follows:

- The facility is in the high category (Category A) if its highest score is greater than or equal to 10;
- The facility is in the intermediate category (Category B) if its highest score is greater than or equal to 1 but less than 10; and,
- The facility is in the low category (Category C) if its highest score is less than 1.

Table 1: DeMinimis Reporting Limits for Toxics

TAC Code	CAS Number	Substance	Degree of Accuracy (lbs/yr)
29	75070	Acetaldehyde	20
30	107028	Acrolein	0.05
31	107131	Acrylonitrile	0.1
32	7664417	Ammonia	200
14	7440382	Arsenic and Compounds (inorganic)	0.01
1	1332214	Asbestos	0.0001
2	71432	Benzene	2
3	7440417	Beryllium	0.001
4	106990	Butadiene [1,3]	0.1
5	7440439	Cadmium	0.01
6	56235	Carbon tetrachloride	1
33	463581	Carbonyl sulfide	100
34	7782505	Chlorine	0.5
35	67663	Chloroform	10
13	18540299	Chromium, hexavalent (and compounds)	0.0001
36	7440508	Copper	0.1
37	7631869	Crystalline silica	0.1
38	117817	Di(2-ethylhexyl) phthalate {DEHP}	20
7	1080	Chlorinated dioxins and dibenzofurans	0.00002
	67562394	*1,2,3,4,6,7,8-Heptachlorodibenzofuran [POM]*	0.000001
	55673897	*1,2,3,4,7,8,9-Heptachlorodibenzofuran [POM]*	0.000001
	35822469	*1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin [POM]*	0.000001
	70648269	*1,2,3,4,7,8-Hexachlorodibenzofuran [POM]*	0.000001
	57117449	*1,2,3,6,7,8-Hexachlorodibenzofuran [POM]*	0.000001
	72918219	*1,2,3,7,8,9-Hexachlorodibenzofuran [POM]*	0.000001
	60851345	*2,3,4,6,7,8-Hexachlorodibenzofuran [POM]*	0.000001
	39227286	*1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin [POM]*	0.000001
	57653857	*1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin [POM]*	0.000001
	19408743	*1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin [POM]*	0.000001
	39001020	*1,2,3,4,5,6,7,8-Octachlorodibenzofuran [POM]*	0.000001
	3268879	*1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin [POM]*	0.000001
	57117416	*1,2,3,7,8-Pentachlorodibenzofuran [POM]*	0.000001
	57117314	*2,3,4,7,8-Pentachlorodibenzofuran [POM]*	0.000001
	40321764	*1,2,3,7,8-Pentachlorodibenzo-p-dioxin [POM]*	0.000001
	51207319	*2,3,7,8-Tetrachlorodibenzofuran [POM]*	0.000001
	1746016	*2,3,7,8-Tetrachlorodibenzo-p-dioxin {TCDD} [POM]*	0.000001
27	78875	1,2-Dichloropropane {Propylene dichloride}	20
28	542756	1,3-Dichloropropene	10
72	9901	Diesel exhaust particulates	10
39	131113	Dimethyl phthalate	50
8	123911	1,4-Dioxane	5
40	100414	Ethyl benzene	200
9	106934	Ethylene dibromide {1,2-Dibromoethane}	0.5

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TAC Code	CAS Number	Substance	Degree of Accuracy (lbs/yr)
10	107062	Ethylene dichloride {1,2-Dichloroethane}	2
11	75218	Ethylene oxide	0.5
22	1104	Fluorocarbons (chlorinated)	1
	76131	*Chlorinated fluorocarbon {CFC-113}*	1
	75434	*Dichlorofluoromethane {Freon 12}*	1
	75694	*Trichlorofluoromethane {Freon 11}*	1
12	50000	Formaldehyde	5
41	1115	Glycol ethers and their acetates	100
	111466	*Diethylene glycol*	100
	111966	*Diethylene glycol dimethyl ether*	100
	112345	*Diethylene glycol monobutyl ether*	100
	111900	*Diethylene glycol monoethyl ether*	100
	111773	*Diethylene glycol monomethyl ether*	100
	25265718	*Dipropylene glycol*	100
	34590948	*Dipropylene glycol monomethyl ether*	100
	629141	*Ethylene glycol diethyl ether*	100
	110714	*Ethylene glycol dimethyl ether*	100
	111762	*Ethylene glycol monobutyl ether*	200
	110805	*Ethylene glycol monoethyl ether*	50
	111159	*Ethylene glycol monoethyl ether acetate*	100
	109864	*Ethylene glycol monomethyl ether*	10
	110496	*Ethylene glycol monomethyl ether acetate*	200
	2807309	*Ethylene glycol monopropyl ether*	100
	107982	*Propylene glycol monomethyl ether*	200
	108656	*Propylene glycol monomethyl ether acetate*	100
	112492	*Triethylene glycol dimethyl ether*	100
42	118741	Hexachlorobenzene	0.1
43	608731	Hexachlorocyclohexanes	0.1
	319846	*alpha-Hexachlorocyclohexane*	0.1
	319857	*beta-Hexachlorocyclohexane*	0.1
	58899	*Lindane {gamma-Hexachlorocyclohexane}*	0.1
44	110543	Hexane	200
45	302012	Hydrazine	0.01
46	7647010	Hydrochloric acid	20
73	7664393	Hydrogen fluoride (hydrofluoric acid)	20
47	7783064	Hydrogen sulfide	5
48	1125	Isocyanates and diisocyanates	0.05
	822060	*Hexamethylene-1,6-diisocyanate*	0.05
	624839	*Methyl isocyanate*	1
	101688	*Methylene diphenyl diisocyanate {MDI} [POM]*	0.1
	1204	*Toluene diisocyanates*	0.1
	584849	*Toluene-2,4-diisocyanate*	0.1
	91087	*Toluene-2,6-diisocyanate*	0.1
15	7439921	Lead compounds (inorganic)	0.5

Table 1: DeMinimis Reporting Limits for Toxics

TAC Code	CAS Number	Substance	Degree of Accuracy (lbs/yr)
49	7439965	Manganese	0.1
		Mercury and mercury compounds	
	7487947	*Mercuric chloride*	1
50	7439976	*Mercury*	1
	593748	*Methyl mercury {Dimethylmercury}*	1
51	67561	Methanol	200
52	74873	Methyl chloride {Chloromethane}	20
23	71556	Methyl chloroform {1,1,1-Trichloroethane}	1
53	78933	Methyl ethyl ketone {2-Butanone}	200
54	108101	Methyl isobutyl ketone {Hexone}	20
55	1634044	Methyl tert-butyl ether	200
16	75092	Methylene chloride {Dichloromethane}	50
17	7440020	Nickel	0.1
57	106467	P-Dichlorobenzene {1,4-Dichlorobenzene}	5
	1151	PAHs, total, w/o individ. components reported [PAH, POM]	0.2
	83329	*Acenaphthene [PAH, POM]*	1
	208968	*Acenaphthylene [PAH, POM]*	1
	120127	*Anthracene [PAH, POM]*	1
	56553	*Benz[a]anthracene [PAH, POM]*	0.5
	50328	*Benzo[a]pyrene [PAH, POM]*	0.05
	205992	*Benzo[b]fluoranthene [PAH, POM]*	0.5
	192972	*Benzo[e]pyrene [PAH, POM]*	0.5
	191242	*Benzo[g,h,i]perylene [PAH, POM]*	0.5
	205823	*Benzo[j]fluoranthene [PAH, POM]*	0.5
	207089	*Benzo[k]fluoranthene [PAH, POM]*	0.5
	218019	*Chrysene [PAH, POM]*	1
19	53703	*Dibenz[a,h]anthracene [PAH, POM]*	0.1
	192654	*Dibenzo[a,e]pyrene [PAH, POM]*	0.05
	189640	*Dibenzo[a,h]pyrene [PAH, POM]*	0.001
	189559	*Dibenzo[a,i]pyrene [PAH, POM]*	0.001
	191300	*Dibenzo[a,l]pyrene [PAH, POM]*	0.001
	206440	*Fluoranthene [PAH, POM]*	0.5
	86737	*Fluorene [PAH, POM]*	0.5
	193395	*Indeno[1,2,3-cd]pyrene [PAH, POM]*	0.5
	91576	*2-Methyl naphthalene [PAH, POM]*	1
	91203	*Naphthalene [PAH, POM]*	1
	198550	*Perylene [PAH, POM]*	0.5
	85018	*Phenanthrene [PAH, POM]*	0.5
	129000	*Pyrene [PAH, POM]*	0.5
56	1336363	PCBs (Polychlorinated biphenyls) [POM]	0.01
58	87865	Pentachlorophenol	10
18	127184	Perchloroethylene {Tetrachloroethene}	5
59	7723140	Phosphorus	0.1

Table 1: DeMinimis Reporting Limits for Toxics

TAC Code	CAS Number	Substance	Degree of Accuracy (lbs/yr)
60		Phosphorous compounds	
	7803512	*Phosphine*	0.01
	7664382	*Phosphoric acid*	50
	10025873	*Phosphorus oxychloride*	0.1
	10026138	*Phosphorus pentachloride*	0.1
	1314563	*Phosphorus pentoxide*	0.1
	7719122	*Phosphorus trichloride*	0.1
	126738	*Tributyl phosphate*	100
	78400	*Triethyl phosphine*	100
	512561	*Trimethyl phosphate*	100
	78308	*Triorthocresyl phosphate [POM]*	0.5
	115866	*Triphenyl phosphate [POM]*	100
	101020	*Triphenyl phosphite [POM]*	100
61		POMS and PAH-derivatives	
	226368	*Dibenz[a,h]acridine [POM]*	0.5
	224420	*Dibenz[a,j]acridine [POM]*	0.5
	194592	*7H-Dibenzo[c,g]carbazole*	0.05
	57976	*7,12-Dimethylbenz[a]anthracene [PAH-Derivative, POM]*	0.0001
	42397648	*1,6-Dinitropyrene [PAH-Derivative, POM]*	0.001
	42397659	*1,8-Dinitropyrene [PAH-Derivative, POM]*	0.05
	56495	*3-Methylcholanthrene [PAH-Derivative, POM]*	0.001
	3697243	*5-Methylchrysene [PAH-Derivative, POM]*	0.05
	101779	*4,4'-Methylenedianiline (and its dichloride) [POM]*	0.1
	602879	*5-Nitroacenaphthene [POM]*	1
	7496028	*6-Nitrochrysene [PAH-Derivative, POM]*	0.001
	607578	*2-Nitrofluorene [PAH-Derivative, POM]*	5
	5522430	*1-Nitropyrene [PAH-Derivative, POM]*	0.5
	57835924	*4-Nitropyrene [POM]*	1
62	75569	Propylene oxide	10
63	91225	Quinoline	100
64		Selenium and compounds	
	7783075	*Hydrogen selenide*	0.5
	7782492	*Selenium*	0.5
	7446346	*Selenium sulfide*	0.5
65	1310732	Sodium hydroxide	2
66	100425	Styrene	100
24	79345	1,1,2,2-Tetrachloroethane	1
67		Sulfuric acid and oleum	
	8014957	*Oleum*	2
	7664939	*Sulfuric acid*	2
	7446719	*Sulfuric trioxide*	2
68	108883	Toluene	200
25	79005	1,1,2-Trichloroethane {Vinyl trichloride}	50
20	79016	Trichloroethylene	20

Table 1: DeMinimis Reporting Limits for Toxics

TAC Code	CAS Number	Substance	Degree of Accuracy (lbs/yr)
26	95636	1,2,4-Trimethylbenzene	5
69	51796	Urethane {Ethyl carbamate}	0.1
21	75014	Vinyl chloride	0.5
70	1330207	Xylenes	200
	108383	*m-Xylene*	200
	95476	*o-Xylene*	200
	106423	*p-Xylene*	200
71	75456	Chlorodifluoromethane {Freon 22}	200

III. REFERENCES

CAPCOA, 1990. **Air Toxics "Hot Spots" Program – Facility Prioritization Guidelines**. Prepared by the AB2588 Risk Assessment Committee of the California Air Pollution Control Officers Association, July 1990.

CAPCOA, 1993. **Air Toxics "Hot Spots" Program – Revised 1992 Risk Assessment Guidelines**. Prepared by the Toxics Committee of the California Air Pollution Control Officers Association, October 1993.

OEHHA, 2002. **Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values.** Prepared by Office of Environmental Health Hazard Assessment OEHHA. http://www.arb.ca.gov/toxics/healthval/contable.pdf.

SCAQMD, 2003. **Risk Assessment Procedures for Rules 1401 and 212**. Prepared by South Coast Air Quality Management District, www.aqmd.gov/permit/RiskAssessment.html.